

**cyclamate.** Group name for synthetic nonnutritive sweetening agents derived from cyclohexylamine or cyclamic acid; the series includes sodium, potassium, and calcium cyclamates. As a result of a study made on laboratory animals in 1970, which indicated that these compounds cause incidence of genetic damage in chick embryos and cancer in rats from high dosage of cyclamates, their use in beverages and food products was banned in the U.S. More recent research has failed to confirm the carcinogenicity of these compounds in laboratory animals, even at levels up to 240 times human intake. Notwithstanding these results, FDA has not withdrawn its ban on use of cyclamates as food additives or as table-top sweeteners, in view of the continuing uncertainty about its safety (1976). The subject is still controversial (1976). See also sweetener, nonnutritive.

**cyclamen alcohol.** The alcohol corresponding to cyclamen aldehyde (q.v.), used as a stabilizer of cyclamen aldehyde.

**cyclamen aldehyde** (methyl para-isopropylphenylpropyl aldehyde)  $(\text{CH}_3)_2\text{CHC}_6\text{H}_4\text{CH}(\text{CH}_3)\text{CH}_2\text{CHO}$ . Properties: Colorless liquid; floral odor. Sp. gr. 0.949–0.959; refractive index 1.507–1.520. Soluble in 1 volume of 80% alcohol; in most oils. Grades: F.C.C. Use: Perfumery; soap perfumes; flavoring.

**cyclamic acid.** USAN name for cyclohexanesulfamic acid (cyclohexylsulfamic acid)  $\text{C}_6\text{H}_{11}\text{NHSO}_3\text{H}$ . Properties: Odorless, white crystalline solid with a sweet-sour taste; m.p. 178–181°C. Strong, stable acid, soluble in water and alcohol; insoluble in oils. Hazard: May be carcinogenic. Uses: Nonnutritive sweetener; acidulant. See also cyclamate.

**cylethrin** 3-(2-cyclopentenyl)-2-methyl-4-oxo-2-cyclopentenyl ester of chrysanthemum monocarboxylic acid. See also furethrin, barthrin, ethythrins. Properties: Viscous brown liquid, soluble in petroleum solvents and other common organic solvents. Formulated principally as liquid for spray applications corresponding to natural pyrethrins. Hazard: Moderately toxic by inhalation and ingestion. Uses: Insecticide with applications similar to allethrin and other analogs.

**cyclic compound.** An organic compound whose structure is characterized by one or more closed rings; it may be mono-, bi-, tri-, or polycyclic depending on the number of rings present. There are three major groups of cyclic compounds: (1) alicyclic, (2) aromatic (also called arene), and (3) heterocyclic. For more detailed information, consult specific entries, and see also organic compound.

**cyclizine hydrochloride** (1-diphenylmethyl-4-methylpiperazine hydrochloride)  $(\text{C}_6\text{H}_5)_2\text{CHC}_4\text{H}_8\text{N}_2\text{CH}_3 \cdot \text{HCl}$ . Properties: White crystalline powder or small colorless crystals. Odorless or nearly so; bitter taste; m.p. 285°C with decomposition; slightly soluble in water, alcohol, chloroform; insoluble in ether; pH (2% solution) 4.5–5.5. Grade: U.S.P. Use: Medicine (antiemetic).

**cycloaliphatic epoxy resin** (cycloalkenyl epoxides). A polymer prepared by epoxidation of multicycloal-

Uses: Space vehicles; outdoor electrical installations in polluted and humid atmospheres; high-temperature adhesives.

**cyclobarbitol** [5-(1-cyclohexenyl)-5-ethylbarbituric acid; tetrahydrophenobarbital]  $\text{C}_{12}\text{H}_{18}\text{N}_2\text{O}_5$ . Properties: White crystals or crystalline powder; odorless; bitter taste; m.p. 170–174°C; soluble in alcohol or ether; very slightly soluble in cold water or benzene. Derivation: Hydrogenation of phenobarbital with colloidal palladium in alcohol as a catalyst. Hazard: See barbiturate. Use: Medicine.

**cyclobutane** (tetramethylene)  $\text{C}_4\text{H}_8$ . Properties: Colorless gas. Sp. gr. 0.7083 (11°C); b.p. 13°C; f.p. –80°C. Insoluble in water; soluble in alcohol and acetone. Derivation: From petroleum. Hazard: Flammable. Dangerous fire risk.

**cyclobutene** (cyclobutylene)  $\text{C}_4\text{H}_6$ . Properties: Gas; sp. gr. 0.733; b.p. 2.0°C. Derivation: From petroleum. Hazard: Flammable. Dangerous fire risk.

**"Cyclocel."** Trademark for a reforming catalyst for gasolines and naphthas. Developed primarily for the cyclo-version process which incorporates catalyst reactivation facilities. Mesh grades 4/8, 4/10.

**cyclocitrylideneacetone.** See ionone.

**cyclocumarol**  $\text{C}_{20}\text{H}_{18}\text{O}_4$ . A synthetic blood anticoagulant. Properties: White, crystalline powder with slight odor. M.p. 164–168°C. Insoluble in water; slightly soluble in alcohol. Use: Medicine.

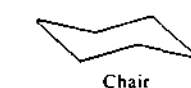
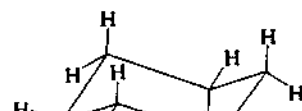
**"Cyclodex."** Trademark for water-dispersible driers with certified metal content of cobalt, lead, or manganese.

**cycloheptane** (heptamethylene; suberane)  $\text{C}_7\text{H}_{14}$ . Properties: Colorless liquid. Soluble in alcohol; insoluble in water. Sp. gr. 0.809; b.p. 117°C; f.p. –12°C; aniline equivalent –6; flash point below 100°F. Grades: Technical. Hazard: Moderately toxic; narcotic action by inhalation. Flammable, dangerous fire risk. Use: Organic synthesis.

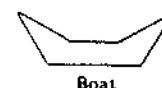
**cycloheptanone** (suberone)  $\text{C}_7\text{H}_{12}\text{O}$ . Properties: Colorless liquid; peppermint odor; b.p. 179°C; sp. gr. 0.95; insoluble in water; soluble in alcohol. Combustible. Hazard: Moderately toxic. Uses: Research; intermediate.

**5-[1-cyclohepten-1-yl]-5-ethylbarbituric acid.** See heptabarbitol.

**cyclohexane** (hexamethylene; hexanaphthene; hexahydrobenzene)  $\text{C}_6\text{H}_{12}$ . Structure: A typical alicyclic hydrocarbon. It may exist in two modifications, called the "chair" and the



Chair



Boat

"chair," as shown. This is due to slight distortion of the bond angles, in accordance with the modified version of Baeyer's strain theory.

Properties: Colorless, mobile liquid. Pungent odor. Sp. gr. 0.779 (20/4°C); b.p. 80.7°C; f.p. –6.3°C; refractive index 1.4263; aniline equiv. 7. Insoluble in water. Soluble in alcohol, acetone, benzene. Flash point (98% grade) –1°F (closed cup). Autoignition temp. 500°F. Flammable limits in air, 1.3 to 8.4%. Derivation: (a) Catalytic hydrogenation of benzene. (b) Constituent of crude petroleum. Grades: 85, 98, 99.86%; spectrophotometric. Containers: Special metal cans and drums; tank cars; pipelines.

Hazard: Flammable, dangerous fire risk. Moderately toxic by inhalation and skin contact. Tolerance, 300 ppm in air. Safety data sheet available from Manufacturing Chemists Assn., Washington, D.C.

Uses: Manufacture of nylon; solvent for cellulose ethers, fats, oils, waxes, bitumens, resins, crude rubber; extracting essential oils; chemical (organic synthesis, recrystallizing medium); paint and varnish remover; glass substitutes; vapor has been used as lubricant for steel (experimental).

Shipping regulations: (Rail) Red label. (Air) Flammable Liquid label.

**1,4-cyclohexanebis(methylamine)**  $\text{C}_6\text{H}_{10}(\text{CH}_3\text{NH}_2)_2$ . The commercial product is about 40% cis and 60% trans.

Properties: Clear liquid; sp. gr. 0.9419 (20/4°C); b.p. 239–244°C. Soluble in all proportions in water, alcohol, and most other organic solvents. Combustible; low toxicity.

Uses: Intermediate; resins.

**cyclohexanecarboxylic acid.** See hexahydrobenzoic acid.

**1,2-cyclohexanedicarboxylic anhydride.** See hexahydrophthalic anhydride.

**1,4-cyclohexanedimethanol (CHDM)**  $\text{C}_6\text{H}_{10}(\text{CH}_2\text{OH})_2$ . Cis and trans isomers are known and are present in the commercial product in about 30 to 70%.

Properties: Liquid; b.p. 286.0°C (735 mm, cis-isomer), 283°C (735 mm, trans-isomer); m.p. 41–61°C; sp. gr. (super-cooled) 1.0381 (25/4°C); flash point 330°F (COC); refractive index (n<sub>D</sub> 20/D) 1.4893. Soluble in water; ethyl alcohol. Combustible.

Uses: Polyester films and protective coatings; reduction of reaction time in esterification.

**cyclohexanesulfamic acid.** See cyclamic acid.

**cyclohexanol** (hexahydrophenol)  $\text{C}_6\text{H}_{11}\text{OH}$ .

Properties: Colorless, oily liquid, camphor-like odor; hygroscopic. Sparingly soluble in water; miscible with most organic solvents and oils. Sp. gr. 0.937 (37/4°C); m.p. 23°C; b.p. 160.9°C; wt/gal approximately 8 lb; flash point 154°F; refractive index 1.465 (22°C). Combustible; autoignition temp. 572°F.

Derivation: Phenol is reduced with hydrogen over active nickel at 160 to 170°F. The cyclohexanone is removed by condensing with benzaldehyde in the presence of alkali.

Containers: Drums; tank cars.

Hazard: Toxic by skin absorption and inhalation. Tolerance, 50 ppm in air. Narcotic in high concentrations.

Uses: Soap making, to incorporate solvents and phenolic insecticides; source of adipic acid for nylon; textile finishing; solvent; blending agent; lacquers; paints and varnishes; finish removers; dry cleaning; emulsified products; leather degreasing; polishes; plasticizers; plastics; germicides.

**cyclohexanol acetate** (cyclohexanyl acetate)  $\text{CH}_3\text{COOC}_6\text{H}_{11}$ .

Properties: Colorless liquid. Odor resembling that of amyl acetate. Miscible with most lacquer solvents and diluents, and with halogenated and hydrogenated hydrocarbons. Soluble in alcohol; insoluble in water; sp. gr. 0.966; b.p. 177°C. Combustible.

Hazard: Narcotic in high concentrations.

Uses: Solvent for nitrocellulose, cellulose ether; bitumens, metallic soaps, basic dyes, blown oils, crude rubber, many natural and synthetic resins and gums; lacquers.

**cyclohexanone** (pimelic ketone; ketohexamethylene)  $\text{C}_6\text{H}_{10}\text{O}$ .

Properties: Water-white to pale yellow liquid with acetone- and peppermint-like odor. Slightly soluble in water. Miscible with most solvents. B.p. 156.7°C; f.p. –47°C; sp. gr. 0.948; flash point 111°F; refractive index (n<sub>D</sub> 20/D) 1.4507; vapor pressure (212°F) 136 mm. Autoignition temp. 788°F. Combustible.

Derivation: By passing cyclohexanol over copper with air at 280°F; also by oxidation of cyclohexanol with chromic acid or oxide.

Containers: Cans; drums; tank cars.

Hazard: Moderate fire risk. Toxic by inhalation and skin contact. Tolerance, 50 ppm in air.

Uses: Organic synthesis, particularly of adipic acid and caprolactam (about 95%); polyvinyl chloride and its copolymers, and methacrylate ester polymers; wood stains; paint and varnish removers; spot removers; degreasing of metals; polishes; leveling agent in dyeing and delustering silk; lube oil additive; general solvent.

**cyclohexanone peroxide** (1-hydroperoxycyclohexyl 1-hydroxycyclohexyl peroxide)  $\text{C}_6\text{H}_{10}(\text{OOH})\text{OOC}_6\text{H}_{10}\text{OH}$ .

Properties: Grayish paste; insoluble in water; soluble in most organic solvents.

Hazard: Dangerous fire risk in contact with organic materials. Strong oxidizing agent.

Shipping regulations: (Rail) (up to 85%) Yellow label. (Air) (not over 50%) Organic Peroxide label; (50–85%) Organic Peroxide label. Not acceptable on passenger planes. (Over 85%) Not acceptable.

**cyclohexanyl acetate.** See cyclohexanol acetate.

**cyclohexene** (1,2,3,4-tetrahydrobenzene)  $\text{C}_6\text{H}_{10}$ .

Properties: Colorless liquid. Sp. gr. 0.811 (20/4°C); b.p. 83°C; f.p. –103.7°C; refractive index 1.445 (25°C); flash point 11°F; aniline equivalent 10; wt/gal 6.7 lb (25°C). Soluble in alcohol; insoluble in water.

Grades: Technical 95%; 99%; research 99.9 mole %.

Containers: Tank cars; barges.

Hazard: Moderately toxic by inhalation. Tolerance, 330 ppm in air. Flammable, dangerous fire risk.

Uses: Organic synthesis; catalyst solvent; oil extrac-